

5

HEAT EXCHANGER DEVICE FOR A GAS SEAL FOR CENTRIFUGAL COM-
PRESSORS

10 The present invention relates to a heat exchanger
device for a gas seal for centrifugal compressors.

As is known, a centrifugal compressor is a machine
which returns a compressible fluid at a higher pressure
than that at which it received it, giving it the neces-
15 sary energy for the pressure change, by the use of a ro-
tor with one or more impellers.

Each impeller, which is connected to the rotor, com-
prises a certain number of blades, radially arranged,
which transfer energy to the gas. The centrifugal step
20 also comprises stator parts which contribute to convert-
ing the kinetic energy of the impeller into gas pressure
energy and cause the gas flow in the compressor.

The gas compression area is delimited by walls, gen-
erally flanges, which support gas seals suitable for pre-
25 venting the pressurized gas from leaving the compressor.

After compression, the temperature of the gas at the compressor delivery can reach a high value; this envisages an extremely accurate selection of the materials and particularly of the gas seal materials.

5 When the temperatures at the compressor delivery are higher than 200°C, there is a sudden perishing of the washers, O-rings and vital parts of the gas seal.

 Furthermore, in some chemical and petrochemical processes, in addition to reaching an extremely high temperature at the delivery, about 275°C, the gas treated is also harmful and for this reason must absolutely remain inside the pressurized parts.

 It has so far appeared to be impossible to block this harmful gas due to this perishability, as a result of the high temperature, of the vital parts of the gas seal.

 It is therefore necessary to find a device which creates an acceptable environment for the gas seal in the case of high temperatures.

20 An objective of the present invention is therefore to solve the problems of the known art by providing a heat exchanging device which does not allow the gas seal to reach the temperature of the process gas.

 A further objective of the present invention is to provide a device which allows the cooling of the gas

seal, which is simple and economical to produce.

These and other objectives are achieved by the present invention which has all the characteristics illustrated in the enclosed claim 1.

5 Further characteristics of the invention are evident from the subsequent claims.

Substantially, the heat exchanger device for a gas seal for centrifugal compressors comprises a fluid heat exchanger situated downstream of the impeller(s) of the
10 compressor to prevent the discharge of gas into the atmosphere and lower the temperature of the seal itself.

According to an advantageous aspect of the present invention, the heat exchanger is cylindrical and envelops the seal, substantially arranged in the direction
15 of the rotor axis.

According to another aspect of the present invention, the heat exchanger is positioned between the seal and supporting flange of the seal.

According to the present invention, the exchanger
20 advantageously comprises an inlet opening and an outlet opening of the cooling liquid connected to each other by a coiled path.

According to a further preferential aspect of the present invention, the inlet duct of the seal gas passes
25 through the exchanger.

The characteristics and advantages of the gas seal exchanger according to the present invention will appear more evident from the following illustrative and non-limiting description, referring to the enclosed schematic drawings, wherein:

figure 1 is a partial longitudinal schematic view of a centrifugal compressor equipped with the gas seal exchanger according to the present invention;

figure 2 is an enlarged schematic view of a detail of the gas seal exchanger of figure 1; and

figure 3 is a perspective schematic view of the heat exchanger according to the present invention.

With reference to the figures, these show a gas seal 1 according to the present invention situated directly downstream of the impeller(s) and supported by a flange 2 to prevent the process gas, i.e. the gas compressed by the compressor 10, being discharged into the environment. The seal 1 is equipped with a fluid heat exchanger 3, situated between the seal 1 and the housing wall of the seal 1. The exchanger 3 is a cylindrical circular exchanger, arranged in an axial direction with respect to the shaft 5 of the impeller(s) so as to enfold the seal 1, as shown in figure 1.

The exchanger 3 also extends between the seal 1 and the supporting flange 2 of the seal itself and is fixed

to this with the known means.

Again with reference to figures 1 and 3, the exchanger 3 comprises at least one inlet opening 4 and at least one outlet opening 6 of the cooling liquid, which
5 are situated above.

The openings 4 and 6 are connected to each other by means of a coiled path 8 for the cooling liquid arranged so as to completely envelope the seal 1, as mentioned above.

10 Between the seal 1 and flange 2 between the inlet opening 4 and outlet opening 6 of the cooling liquid, at least one inlet duct 7 of the seal gas is positioned so as to be surrounded by the exchanger 3.

The seal blockage gas is supplied, in the known way,
15 through the supply duct 7.

The cooling liquid used in the exchanger 3, according to the present invention, is water which, by circulating through the coiled path 8, cools the internal surface of the exchanger 3 creating an acceptable temperature
20 ture (100°C) for the gas seal.

It can thus be seen that the seal 1 according to the present invention achieves the objectives listed above.

In particular, it allows the temperature of the environment in which the seal is housed, to be lowered,
25 enabling its correct functioning in terms of performance

and duration.

Numerous modifications and variations can be applied to the gas seal exchanger of the present invention, thus conceived, all included within the scope of the inventive
5 concept.

Furthermore, in practice, the materials used, as also their dimensions and components can vary according to technical demands.

10

15

20

25